Bonneville Power Administration
Fish and Wildlife Program FY99 Proposal Form

Section 1. General administrative information

Determine if salmon are successfully spawning below lower Columbia main stem dams

Bonneville project number, if an ongoing project **9105**

Business name of agency, institution or organization requesting funding
Washington Department of Fish and Wildlife, Oregon Department of Fish and Wildlife

Business acronym (if appropriate) **WDFW**

Proposal contact person or principal investigator:

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Subcontractors. List one subcontractor per row; to add more rows, press Alt-Insert from within this table

Organization	Mailing Address	City, ST Zip	Contact Name
ODFW	2501 SW First, Ave, Box 59	Portland, Or. 97207	Sharon Conyers

NPPC Program Measure Number(s) which this project addresses.
Sections 3.3, 3.3A.2, 3.B, 7.0D, 7.1A, 7.1C, 7.1F, 7.5D.1, 8.1, 8.1A.1, 8.1A.2, 8.1A.3, 8.4B.1,8.4D, 8.4D.1, 8.4D.3

NMFS Biological Opinion Number(s) which this project addresses.

NMFS ESA - Section 7 Biological opinion on the reinitiation of consultation on 1984-1998 operation of the Federal Columbia River Power System and Juvenile Transport Program.

Other planning document references.

If the project type is "Watershed" (see Section 2), reference any demonstrable support from affected agencies, tribes, local watershed groups, and public and/or private landowners, and cite available documentation.

Subbasin.

Short description.

Search for evidence of fall chinook spawning in the main stem Columbia below Bonneville, The Dalles, John Day, and McNary dams. Collect data to determine if these fish are spawning successfully, profile the stock, and determine the origin of the stock. Document locations of spawning areas. Search for evidence of juvenile production from fall chinook spawning in the main stem Columbia below Bonneville Dam. Determine origin of fall chinook rearing in Hamilton Slough (below Bonneville Dam) and identify emegence and emigration timing. Investigate possibility of using Coded Wire Tags (CWT) and PIT tags to determine juvenile to adult survival rates and migration timing through the lower Columbia River. Attempt to identify environmental factors effecting spawning success, juvenile production, migration timing, and juvenile to adult survival rates.

Section 2. Key words

	Programmatic Categories		Activities		Project Types
X	Anadromous fish		Construction		Watershed
	Resident fish		O & M	*	Biodiversity/genetics
	Wildlife		Production	X	Population dynamics
	Oceans/estuaries	*	Research		Ecosystems
	Climate	X	Monitoring/eval.	*	Flow/survival
	Other	*	Resource mgmt		Fish disease
			Planning/admin.		Supplementation
			Enforcement		Wildlife habitat enhancement/restoration
			Acquisitions		

Other keywords.

Pilot study, DNA, GSI, stock identification, CWT recoveries, stock profiling, run reconstruction, run prediction, stock accountability, interdam conversion rates, biological sampling, mark sampling, age and stock composition, GPS, PIT tagging, emergence timing, emigration timing, survival rates, migration timing, mark rate, environmental factors, stranding.

Section 3. Relationships to other Bonneville projects

Project #	Project title/description	Nature of relationship
	PATH	This project would provide additional data for analysis
8201300	Coded-wire Tag Recovery Project	This project would provide additional data
	Stream-Net	This project would provide additional data

Section 4. Objectives, tasks and schedules

Objectives and tasks

Obj 1,2,3	Objective	Task a,b,c	Task
1	Document evidence of fall chinook and chum spawning below Bonneville, The Dalles, John Day, and McNary Dams.	a	Count redds by on-water observations
		b	Count live/dead fish by on-water observations
		c	Record locations of live fish and redds by GPS
		d	Coordinate possible draw downs to complete tasks a and b
		e	Improve population estimates for fall chinook spawning below Bonneville Dam
		f	Expand sampling area below Bonnville Dam and develop population estimates for chum
2	Determine if the fall chinook and chum are spawning successfully	a	Collect carcasses and estimate number of remaining eggs
3	Collect biological data to profile stock	a	Collect scales, fork lengths, and sex information
4	Profile stock using biological	a	Determine age composition

	data		**based on scale readings**
		b	**Press scales**
		c	**Use sex ratio data to determine % females**
5	**Collect data to determine stock origin**	**a**	**Examine carcasses for missing fins (mark sample)**
		b	**Collect snouts of adipose-clipped fish**
		c	**Recover and read CWTs**
		d	**Collect GSI and DNA tissue samples**
6	**Determine possible stock origins**	**a**	**Use adult or juvenile tag rates to determine stock origins based on CWT recoveries**
		b	**Perform genetic baseline analysis**
7	**Document findings**	**a**	**Write a report to document findings**
8	**Determine emergence timing of juvenile fall chinook and chum spawning below Bonneville Dam**	**a**	**Install emergence traps on a subsample of the redds identified in Objective 1 Task C**
		b	**Monitor emergence traps and record beginning and ending emergence dates for all redds sampled**
		c	**Attempt to identify any relationships that exist between emergence timing environmental variables (i.e. redd location, flow, temperature)**
		d	**Investigate other methods for determining emergence timing**
9	**Determine emigration time and size for juvenile fall chinook and chum rearing below Bonneville Dam**	**a**	**Collect juvenile fall chinook and chum in Hamilton Slough (below Bonneville Dam) with a stick or beach seine on a weekly basis**
		b	**Sample catch for average length and weight data**
		c	**Record and track catch rates and size of juvenile fall chinook**
		d	**Attempt to identify any**

			relationships that may exist between emigration time and size and enviromental factors (i.e. flow, temperature)
10	**Determine stock composition of juvenile fall chinook and chum rearing below Bonneville Dam**	**a**	**Collect juvenile fall chinook and chum in conjunction with Objective 9 Task a**
		b	**Collect GSI and DNA tissue samples from juvenile fall chinook**
		c	**Perform genetic baseline analysis**
		d	**Examine juvenile fall chinook for fin clips**
		e	**Attempt to identify any relationships that may exist between mark rate and environmental variables (i.e. flow, temperature)**
11	**Determine extent of stranding of juvenile fall chinook and chum rearing below Bonneville Dam**	**a**	**Record number of juvenile fall chinook and chum stranded in shallow water areas in Hamilton Slough (below Bonneville Dam) on a weekly basis.**
		b	**Attempt to identify any relationships that may exist between stranding and environmental factors (i.e redd location, flow)**
12	**Investigate feasibility of marking juvenile fall chinook captured below Bonneville Dam to determine juvenile to adult survival rate**	**a**	**Collect juvenile fall chinook in conjunction with Objective 9 Task a**
		b	**Tag limited number of juvenile fall chinook with a CWT, if of adequate size**
		c	**Track recoveries in fisheries and escapement areas**
		d	**Attempt to identify any relationships that may exist between survival rates and environmental variables (i.e. flow, temperature)**

		e	**Determine sample size necessary for determining juvenile to adult survival rate**
		f	**Determine feasibility of tagging number of juvenile fall chinook identified in Objective 11 Task d**
13	**Investigate feasibility of marking juvenile fall chinook captured below Bonneville Dam to determine migration rate through the lower Columbia River**	**a**	**Collect juvenile fall chinook in conjunction with Objective 9 Task a**
		b	**Tag limited number of juvenile fall chinook with a PIT tag, if of adequate size**
		c	**Track recoveries by NMFS during juvenile seining project in the lower Columbia River (at Jones Beach)**
		d	**Attempt to identify any relationships that may exist between migration rate and environment variables (i.e. flow, temperature)**
		e	**Determine sample size necessary for determining migration timing**
		f	**Determine feasibility of tagging number of juvenile fall chinook identified in Objective 12 Task d**
14	**Document findings**	**a**	**Write a report to document findings**

Objective schedules and costs

Objective #	Start Date mm/yyyy	End Date mm/yyyy	Cost %
1	10/1998	12/1998	15
2	10/1998	12/1998	2.5
3	10/1998	12/1998	2.5
4	12/1998	01/1999	5
5	10/1998	12/1998	10
6	12/1998	02/1999	10
7	02/1999	04/1999	5
8	04/1999	06/1999	10

9	**05/1999**	**08/1999**	**10**
10	**05/1999**	**08/1999**	**15**
11	**05/1999**	**08/1999**	**2.5**
12	**05/1999**	**07/1999**	**2.5**
13	**05/1999**	**07/1999**	**2.5**
14	**09/1999**	**12/1999**	**7.5**

Schedule constraints.

Bad weather, high river flows.

Completion date.

Except for GSI and DNA sampling, annual funding is expected to be required

Section 5. Budget

FY99 budget by line item

Item	Note	FY98
Personnel	ADULT PORTION ($32,651) : WDFW Fish Biologist 3 one-month ($3,833) ODFW Natural Resource Specialist 2 four-months ($12,400) WDFW Scientific Technician 3 three-months ($8,343) 2 ODFW Environmental Biological Aides 2.5- months each ($8,075) JUVENILE PORTION ($46,284) : ODFW Natural Resource Specialist 4 two months ($8,262) ODFW Supervisory Fish and Wildlife Biologist one month ($3,642) ODFW Natural Specialist 2 four months ($12,400) WDFW Scientific Technician 3 five months ($13,905) ODFW Experimental Aide 5 months ($8,075)	$78,935
Fringe benefits	ADULT PORTION ($9,786) : WDFW Biologist 26% ($997), ODFW Natural Resource Specialist and Experimental Biological Aides 36% ($7,371), WDFW Scientific Technician 3 17% ($1,418) JUVENILE PORTION (14,020) :	$23,806

	ODFW Natural Resource Specialists 4 and 2, Supervisory Fish and Wildlife Biologists, and Experimental Biological Aides 36% ($11,656), WDFW Scientific Technician 3 17% (2,364)	
Supplies, materials, non-expendable property	ADULT PORTION ($2,500) : gaffs, machettes,fish tote,polarized glasses, waders, boots, raingear, knives, forceps (Total $2,000) Dry-ice ($500) JUVENILE PORTION ($2,000) : boots, raingear, waders, forcepts, measuring boards, net mending supplies, (Total $1,000) Dry ice ($1,000)	$4,500
Operations & maintenance	ADULT PORTION ($6,100) : Vehicle Rent ($1,300) Boat Rent ($4,800) JUVENILE PORTION (7,600) : Vehicle Rent ($1,600) Boat Rent ($6,000)	$13,700
Capital acquisitions or improvements (e.g. land, buildings, major equip.)		$0
PIT tags	JUVENILE PORTION ($150) : 50 of tags ($150)	$150
Travel	ADULT PORTION ($3,672) : Lodging ($1,800) Per Diem ($1,872) JUVENILE PORTION ($1,000) : Vehicle Mileage ($1,000)	$4,672
Indirect costs	ADULT PORTION ($13,546) : ODFW Salaries and Benefits, 1/3 Travel 22% ($6,395) WDFW Salaries and Benefits, Travel Supplies, O&M, GSI analysis 19% ($7,151) JUVENILE PORTION ($10,623) : ODFW Salaries and Benefits, Supplies, PIT Tags, Travel, Coded Wire Tagging, 22% ($10,623) WDFW Salaries and Benefits, O&M 36% (7,727)	$12,661
Subcontracts		$0
Other	ADULT PORTION ($12,000) : GSI Analysis ($12,000) JUVENILE PORTION ($17,900) : GSI Analysis ($16,800)	$29,900

	Coded Wire Tagging ($1,100)	
TOTAL		$75,181

Outyear costs

Outyear costs	**FY2000**	**FY01**	**FY02**	**FY03**
Total budget	$194,841	$204,583	$214,812	$225,526
O&M as % of total	7	7	7	7

Section 6. Abstract

Are fall chinook and chum spawning in the existing habitat downstream The Dalles, John Day, and McNary dams? Are they spawning successfully? How large are the fall chinook and chum populations spawning below Bonneville Dam and is it growing? Where did they come from? The goal is to answer these questions by looking for evidence of spawning fish/redds and by the collection of carcasses. These methods are consistent with those used by WDFW and ODFW in other areas of the Columbia River. Live fish and redd counts would be made by technicians/aides from a boat. Spawning redds would be recorded on a GPS which use satellites to record locations within a few feet. Carcasses collected by boat or walking the banks would be sampled for scales to determine age composition. Numbers of remaining eggs would be used to determine spawning success. Additionally, each carcass would be examined for the presence/absence of an adipose fin (CWT fish). CWT recoveries would be used to determine stock composition. Genetic and DNA samples would be used in conjunction with CWT recoveries to confirm stock origin. The results would document presence/absence and origin of fall chinook spawning below lower Columbia dams in the fall of 1998. The adult portion of this project would run from October 1998 to March 1999. Results would be summarized in a written report. Annual observations and funding would be needed to monitor any populations that are found.

Are spawning adults producing fry? When do the juveniles emerge from the gravel? When and at what size do the do the juveniles begin moving downstream to the ocean? How long does it take the juveniles to move from their rearing area to the ocean? How many juveniles survive to return as adults? What are the environmental conditions necessary for successful spawning, incubation, emergence, rearing, migration, and juvenile to adult survival? The purpose is to answer these questions by sampling and marking juvenile fall chinook rearing in areas where redds are observed. A randomly selected portion of all redds will be sampled using emergent traps to determine emergence timing. Weekly surveys of shallow water areas will occur to determine if juvenile fall chinook and chum are susceptible to stranding. Weekly juvenile seining trips in rearing areas near the documented spawning grounds will be performed to determine if and for how long juvenile fall chinook rear in this area before moving downstream. In conjunction with the juvenile seining, genetic and DNA samples will be obtained to determine the stock origin. Mark rates (ad clips) will be determined to identify the presence of juvenile hatchery fish, but CWT's will not be collected. If

feasible a subsample of juvenile fall chinook will be marked with CWT's or PIT tags. PIT tags will be recovered in the lower Columbia River near Jones Beach and will provide and estimate of the migration rate through the lower Columbia. CWT's will be recovered from returning adults to determine the juvenile to adult survival rate.

Section 7. Project description

a. Technical and/or scientific background.

The overall problem is that with current funding, the areas below Bonneville, The Dalles, John Day, and McNary dams cannot be adequately surveyed for evidence of spawning fall chinook and chum. If funds were transferred for sampling these areas, sampling goals for the Columbia River and its tributaries would not be met. However, limited sampling has shown that fall chinook have been spawning below John Day Dam. WDFW investigated some areas below the dam in 1982. Eighty-five fall chinook carcasses were found that year and one CWT was recovered, a Hagerman (Snake River) fish (WDFW memorandum, 1983). The following year, five spawned-out carcasses were found (WDFW memorandum, 1984). WDFW revisited the area in 1995 and found a handful of live and dead fish. River flows during that one-day survey were extremely high.

There currently is known to be a fall chinook population spawning below Bonneville Dam; however, there has been no information gathered concerning juveniles produced by this population (Hymer, 1997). Currently there are no plans and no funding available to collect any data concerning the juveniles produced by this population. Critical data concerning emergence timing, stranding rates, migration timing, and juvenile to adult survival rates will be collected by this project in order to identify management actions, including mainstem flow operations to enhance production. A logical extension of identifying an adult naturally spawning population would be to sample the juveniles produced by that population. Currently similar studies are being performed by WDFW on the upper Columbia River in the Hanford Reach area since 1996 and on the Lewis River since 1985. (Hawkins, 1996 and Norman, 1985).

The proposed project can be linked to several other projects. One project is the BPA CWT Recovery Project. CWT recoveries from the areas below Columbia River mid-Columbia dams would help complete accountability of Columbia River fall chinook. Biological and mark sampling data is used by managers for Columbia River fall chinook run reconstruction's and run predictions. A subcommittee of senior biologists from WDFW, ODFW, and USFWS Columbia River Technical Advisory Committee have used this information to make Columbia River fall chinook final forecasts since 1980. It is important to note that currently these fish are not tagged with CWT's and therefore are not represented in current run reconstruction techniques or harvest management scenarios.

Though this project itself is not a mitigation project, it could be used in the evaluation of a multitude of mitigation projects. This project will be very important in identifying management scenarios for operation of the federally operated dams on the lower Columbia River.

The PATH model would benefit from this project. PATH determines the conversion rates between Columbia River dams. This model depends upon fall chinook accountability. Fish unaccounted for are assumed to be the result of inter-dam losses. If populations of fall chinook are found below The Dalles, John Day, and McNary dams, the number of unaccounted fish is reduced. The PATH model also depends on data concerning juvenile fall chinook and juvenile to adult survival rates. Data concerning juvenile fall chinook would allow biologists to better define parameters used the PATH process and Life Cycle Models.

The BPA funded StreamNet project would also benefit from this project. Data collected from this project could be directly incorporated into the StreamNet database. Data collected from both the adult and juvenile portions of this project would be of high value to StreamNet users.

Proposal objectives.

1. To determine if fall chinook and chum are spawning below Bonneville, the Dalles, John Day, or McNary dams.

2. To document location of the spawning area.

3. To determine if the fish in these areas are spawning successfully.

4. To collect biological data to profile this stock.

5. To determine stock origins of fish spawning in this area.

6. Report findings in a written report.

7. To determine emergence timing of juvenile fall chinook and chum in previously identified spawning areas

8. To determine stranding rates of juvenile fall chinook and chum near spawning areas.

9. To emergence timing and collect biological data concerning juvenile fall chinook rearing near spawning areas.

10. To determine stock origins of juvenile fall chinook rearing near spawning areas.

11. To determine the feasibility of tagging fish for the purpose of determining migration timing and juvenile to adult survival rates.

12. Identify mainstem mitigation measures to protect and enhance production

13. Report findings in a written report.

c. Rationale and significance to Regional Programs.

Specific Benefits to NPPC's Fish and Wildlife Program:

1. **Develop Coordinated Information System (StreamNet) and Prepare Monitoring Report (section 3.3)** : Provide data to the anadromous fish data base (section 3.3B) and the Coordinated Information System (StreamNet) (section 3.3A.2). Data provided will be used to annually update and enhance information in the stock summary reports. In turn, stock summary reports are used to provide information on program implementation, performance standards, harvest, and stock status.
2. **Comprehensive Environment Analysis of Federal Production Activities (section 7.0D)** : The Programmatic Environmental Impact Statement is designed to asses the impacts on naturally produced salmon of fish being introduced from federally funded hatcheries in the Columbia River Basin. U.S. Fish and Wildlife Service will be evaluating hatchery practices in response to this concern.
3. **Evaluation of Carrying Capacity (7.1A)** : Implementing the ecosystem approach will require knowledge of the Columbia River ecosystem. Bonneville and federal agencies will evaluate salmon survival in the Columbia River, its estuary, and in near-shore ocean response.
4. **Collection of Population Status, Life History, and Other Data on Wild and Naturally Spawning Populations (7.1C)** : Base-line information that will improve management of wild and naturally spawning stocks is needed and long term monitoring strategies must be developed.
5. **Systemwide and Cumulative Impacts of Existing and Proposed Artificial Production Projects (Section 7.1F)** : Study will be designed that evaluates impacts of artificial production activities on ecology, genetics, and other important characteristics of Columbia River Basin anadromous and resident fish. Additionally, method for assessing impacts from proposed new artificial production projects will be developed.
6. **Develop Harvest Goals and Escapement Objectives (8.1, 8.1A.1-3)** : Provide data that will allow development and/or reevaluation of management goals, spawning ground escapement objectives, and improve statistical quality of run forecasting. The data also will contribute to revision of Columbia River Fish Management Plan and PFMC's Salmon Plan to project and account for needs of Columbia and Snake River salmon and sockeye populations, including those listed by ESA.

This project would also directly benefit the CWT recovery program and the PATH program. Both Of these projects currently receive funding for the BPA.

d. Project history

New project-Not applicable.

e. **Methods**.

1. Document evidence of fall chinook and chum spawning below Bonneville, The Dalles, John Day, and McNary dams. Technicians/Aides will count live fish and redds from a boat. Locations of fish and redds will be recorded by GPS. Technicians/Aides will gaff carcasses by boat or walking the bank. Critical assumptions are that live fish and redds will be able to be seen by boat. Carcasses had been found during earlier explorations below John Day Dam. Below Bonneville Dam, live fish can be counted. Below Priest Rapids Dam, redds can be counted by land or by air. One factor that may limit the success of this objective is river flows. If river flows are high, fish/redds may not be seen but may exist. Drawing down the river may be one method to ensure the success of measuring this objective.

Another assumption is the spawn timing will be similar to the Hanford Reach and below Bonneville. In both cases, those fish spawn from late October through mid-December.

2. Determine if fish are spawning successfully below the dams. Remaining eggs will be counted from carcasses to determine spawning success. The remaining question is whether these fish are producing any progeny. This issue is addressed for the area below Bonneville Dam later in this project proposal and could be addressed for areas below The Dalles, John Day, and McNary dams in future years if there is evidence of fall chinook spawning in these areas.

3. Document origins of these fish. Each carcass will be examined for the presence/absence of an adipose fin. Snouts will be removed from adipose clipped fish. CWTs will be recovered and read. Stock composition will be conducted from the CWT recovery information. Adult escapement rates will be applied to determine the stock origins. If adult escapement information is unavailable, juvenile release rates will be applied. This method is consistent with WDFW, ODFW, and USFWS run reconstruction and run prediction methods.

One assumption is that enough CWTs will be found for analysis. If too few tags are found, GSI and DNA information will be used to determine the origin of this stock.

Technicians/Aides will collect Genetic and DNA samples throughout the sampling period. Tissue, muscle, and fin samples will be collected from fresh carcasses. Samples will be placed on dry-ice. Samples will be transferred for temporary storage in a super-freezer until the end of the sampling period. From the super-freezer, the samples will be delivered to the GSI Lab in Olympia for analysis. Results from the GSI analysis will be compared to baseline collections.

The goal is 100 samples per each area. If this goal is unattainable in one year, samples could be spread over the years necessary to reach this goal.

4. Technicians/Aides will collect biological information to determine if these populations are a single event. Scales, fork lengths, and sex information will be collected. Scales will be pressed and read for age composition. If multiple age classes are found, evidence would suggest these fish could be from an established population rather than a single event. All biological data will be entered by the Natural Resource Specialist 2 into an established computerized data base. Scales and CWTs will also be read by the Natural Resource Specialist 2.

5. A written report will document the findings from the adult portion of this project. The findings will include whether live fall chinook or redds were found and the general locations of the redds. The average, minimum, and maximum number of eggs per carcass will be listed. The number of carcasses examined for biological and mark sampling will be displayed in paper and computerized data base formats. The number of CWTs recovered will be summarized. Age and stock compositions will be presented. A Natural Resource Specialist will be the primary author of this report. The Fish Biologist 3 will review the draft of this report and provide comments and suggestions. The GSI Lab in Olympia will present a paper with the genetic results.

6. Determine emergence timing. Emergence traps will be deployed on redds identified during the previous spawning season. Redds to be sampled will be chosen based on their depth and location so that redds from a variety of depths and locations are sampled. Individual redds will be identified using the GPS readings collected during the previous spawning season. Traps will be monitored on a regular basis (every 1-3 days) and the number of fry emerging per monitoring period will be recorded.

The major assumption is that habitat is adequate to produce fry from redds in this area. Additionally, it is assumed that fry in this area incubate at rates similar to fall chinook in other areas with temperature being the major factor in determining incubation period.

NRS-2 and EBA will be responsible for deploying and monitoring of all redd traps. NRS-2 will be responsible for selecting redds on which to deploy traps. The NRS-4 will attempt to correlate emergence time to flow, redd location, and water temperatures.

7. Determine if stranding of juveniles in shallow water areas occurs in Hamilton Slough. Weekly surveys of shallow water areas will be performed and the number of fall chinook and chum stranded will be recorded.

The NRS-2, Tech-3 and EBA will be responsible for performing weekly surveys. The NRS-4 will attempt to correlate stranding rates to flows and redd locations.

8. Determine if and for how long juveniles rear in Hamilton Slough. Using either beach or stick seine, collect juvenile fish from Hamilton Slough weekly during the months of

May through August. Both type of seines will be used to determine which is most effective at capturing juvenile fall chinook and chum. All fish captured will be identified by species and fall chinook and chum will be measured and any marks (including fin clips) will be noted. Weekly mark rates (fin clips) will be used to determine when and if there is an influx of hatchery fish into our study area. Stock composition of juvenile fall chinook will be based on GSI and DNA information collected by this project. Tissue, muscle, and fin samples will be collected from juvenile fall chinook. Samples will be placed on dry-ice. Samples will be transferred for temporary storage in a super-freezer until the end of the sampling period. From the super-freezer, the samples will be delivered to the GSI Lab in Olympia for analysis. Results from the GSI analysis will be compared to baseline collections. The goal will be 25 samples per week.

The major assumption is that fish collected in this area are actually rearing in that location and not moving through that area on their downstream migration.

NRS-2, Tech-3, and EBA will perform weekly seining, collect genetic and DNA samples, take lengths from juvenile chinook and chum, and calculate weekly mark rates. The NRS-4 will analyze emigration size and timing in relationship to environmental variables.

9. Determine migration rates through the lower Columbia River. Fish will be collected in conjunction with juvenile seining. PIT tags will be applied to a subsample of the fish collected. Recoveries of PIT tags will occur in the lower Columbia River near Jones Beach by the NMFS. Travel time from the tagging location to recovery site will be determined for each individual fish and summarized for the entire tag group. The logistics of this operation is still in question at this point in time so for this contract only a limited number of fish will be tagged in conjunction with the aforementioned seining schedule.

The major assumptions are that fish will attain an adequate size for tagging prior to leaving the sample area and that fish tagged are offspring of naturally spawning adults from the study area.

The NRS-2,Tech-3, and EBA will tag fish. The NRS-4 will work with NMFS to calculate and analyze migration rates through the lower Columbia River.

10. Determine inriver and juvenile to adult rates. Fish will be collected in conjunction with juvenile seining. CWT's will be applied to a subsample of the fish collected. Recoveries of CWT's will occur in the lower Columbia River near Jones Beach by the NMFS, in ocean and inriver fisheries, and at escapement areas. Based on CWT recovery data inriver and juvenile to adult survival rates will be calculated. The logistics of this operation is still in question at this point in time so for this contract only a limited number of fish will be tagged in conjunction with the aforementioned seining schedule.

The major assumptions are that fish will attain an adequate size for tagging prior to leaving the sample area and that fish tagged are offspring of naturally spawning adults from the study area.

The NRS-1,Tech-3, and EBA will tag fish. The NRS-3 will calculate and analyze inriver and juvenile to adult survival rates.

A written report will document the findings for the juvenile portion of this project.. Findings will include redds sampled for emergence timing and beginning and ending emergence dates for each redd. Emergence data will be summarized for all redds sampled and any correlation between emergence timing and flow and redd location will be presented in this report. Weekly summaries of species collected in juvenile seining operation, stock composition, and biological data collected from juvenile chinook and chum will also be included. Results concerning feasibility of marking juvenile chinook with PIT tags and CWT's will be evaluated. The Natural Resource Specialist 2 will be the primary author of this report, however, the Naturally Resource Specialist 4 will provide technical and analytical expertise with respect to data analysis procedures.

4.f. Facilities and equipment.

In Washington, the main stem Columbia River and its tributaries downstream from McNary Dam are sampled from the Vancouver office. Under this proposal, the WDFW Biologist 3 and Scientific Technician 3 would be stationed there. Office space and computers are available.

All ODFW employees working on this project, except the Natural Resource Specialist 4's, will be stationed out of Clackamas. The Natural Resource Specialists would be stationed out of Portland. All employees are provided office space, computers, support staff, and other office supplies necessary to complete this project.

Boats and vehicles are also available at the Vancouver office. A jet-pump powered sled with a high power outboard engine would be rented from WDFW. Railings are attached to the bow of the boat for on-water observations. Life preservers, rings, and first aid kits are readily available. The WDFW boat rent charges would included gas, oil, general maintenance, and emergency repair tools.

WDFW has used these boats in a multitude of main stem Columbia and tributary areas. They have been used for juvenile and adult sampling in the Hanford Reach and Lewis River and adult sampling below Bonneville Dam. They have proved suitable for those jobs. Unfortunately, the use of a single boat currently used in the adult sampling below Bonneville Dam fall would not be sufficient to complete the proposed objectives. Therefore, an additional boat would be rented to complete the additional tasks listed in this proposal. WDFW would continue to supply a boat for the current basic activities.

The boat rented in this proposal would also be used upstream from Bonneville Dam. After sampling the Bonneville area, the boat and personnel would continue upstream to sample areas below The Dalles, John Day, and McNary dams. In addition, this boat would be used for the juvenile objectives listed in this proposal. A ODFW boat could be used as a back up.

A four wheel drive truck would be rented from WDFW. This vehicle would be equipped with a canopy and trailer hitch, light system, and a ball to haul the jet sled. The vehicle rent would include gas, oil, general maintenance, emergency repair tools, jumper cables, spare keys, and a first-aid kit.

A four wheel drive truck is desired to haul personnel and the boat. Generally 4 wheel drives are larger and could haul three persons. Some of the area boat launches are primitive. In addition, road conditions in the fall/early winter can be dangerous.

General sampling supplies for the adult portion of this proposal includes gaffs for collecting carcasses, machetes for mutilating tails to prevent re-sampling, and a tote for holding the fish in the boat. Polarized glasses are needed to reduce water surface glare. Samplers need to be equipped with neoprene waders and boots plus rain coats and pants. Knives, forceps, and tape measures are needed for sampling carcasses. A GPS would be needed to be purchased for documenting locations of spawning fish.

General sampling supplies for the juvenile portion of this proposal would include the use of WDFW stick and beach seines. Materials will be needed for repairing damaged gear. ODFW would supply the emergent traps. Five gallon buckets, plastic garbage cans, small nets, measuring boards, and weight scales will be needed for sampling juveniles. The waders, boots and rain gear from the adult portion of this proposal could be used for the juvenile work if the same samplers are used. If not, additional boots and rain gear may be needed.

g. References.

DeVore, J. 1/12/83. WDFW memorandum from John DeVore to Don McIsaac.

DeVore, J. 1/12/83. 1982 Columbia River and Columbia River Tributary Stream Survey Mark Sampling Results. WDF memorandum to Don McIsaac. Washington Department of Fisheries. Vancouver, Washington.

Fiscus, H. 2/22/84. WDFW memorandum from Hugh Fiscus to Dick O'Conner.

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Hawkins S. December 1992. The Capture and Tagging of Naturally Produced Pre-Smolt Upriver Bright Fall Chinook on the Hanford Reach of the Columbia

River, 1992. WDF Columbia River Progress Report # 92-33. Washington Department of Fisheries. Battle Ground, Washington.

Hawkins, S. May 1996. Lewis River Wild Stock Fall Chinook Tagging Project. WDFW Columbia River Progress Report # 96-08. Washington Department of Fish and Wildlife. Battle Ground, Washington.

Hymer, J. April 1997. Results of Studies on Chinook Spawning in the Mainstem Columbia River below Bonneville Dam. Columbia River Progress Report # 97-09. Washington Department of Fish and Wildlife. Battle Ground, Washington.

Norman, G. 9/6/85. Feasibility of Coded-Wire-Tagging Wild Upriver Bright Zero Age Fall Chinook on the Columbia River at the Hanford Reach. WDF memorandum to Don McIsaac. Washington Department of Fisheries. Battle Ground, Washington.

Section 8. Relationships to other projects

Documentation of spawning population in the mainstem Columbia River downstream from McNary Dam is critical for reconstructing runs and producing run size forecasts. Full accountability of spawning populations is necessary to calculate accurate conversion rates which are a critical component when performing run reconstruction for Columbia River fall chinook stocks. Inaccurate stock sizes lead to inaccurate run size forecasts which the PSC depend on for setting ocean fishing seasons. Accurate stock size estimates and preseason forecasts are also critical for the U.S. v Oregon Columbia River Compact to manage Columbia River fisheries in a manner that limits harvest of ESA listed stocks while harvesting surplus hatchery fish.

Currently fall chinook naturally spawning in mainstem portions of the lower Columbia River are not accounted for in run reconstruction or harvest management because they are not marked with a CWT. Currently all natural production in the lower mainstem Columbia River is considered part of the Bonneville Upriver Bright (BUB) stock and BUB CWT recoveries are assumed to include this natual production. CWT's are critical to documentation of a stock/s contribution to inriver and ocean fisheries and returns to escapement areas. Tagging this stock of fall chinook would not only allow for documentation of its presence in fisheries and escapement areas but may also produce data (i.e. migration timing, survival rates) that could be applied to other Columbia River fall chinook stocks for harvest management and run reconstruction needs. These data will benefit the BPA funded CWT recovery program by increasing mark sample size, CWT recoveries, and establishing better population estimates below Bonneville Dam.

Currently hatchery fish are used as surrogates for wild fish in both fisheries management and when managing the Columbia River to benefit juvenile salmon survival. This project intends to collect data concerning juvenile life history of Columbia River fall chinook where limited data currently exists. Knowledge of emergence timing, stranding rates, and migration rates through the lower Columbia River will help water managers, *including the Fish Passage Advisory Committee, manage the Columbia River for the benefit of fall chinook and chum spawning in the lower Columbia River. Survival rates produced by this project may reduce the current dependency on using hatchery fish as surrogates for wild fish. Data produced by this project would be of great value to the BPA funded PATH project. Data collected by this project could be directly used in life cycle models developed by the PATH project by better defining the value and variation of several parameters used in these models. Life cycle models are an important tool for identifying the effects of fisheries and water management on the long term survivability of Columbia River wild fall chinook.*

Section 9. Key personnel

.Joe Hymer
Fish and Wildlife Biologist 3
Pacific States Marine Fisheries Commission
Vancouver, Washington

FTE/Hours

Education A.S. Fish and Wildlife Grays Harbor College, 1980

Summary of Qualifications

Eighteen years of service for Washington Department of Fish and Wildlife/Pacific States Marine Fisheries Commission on fishery management and research programs. Seventeen years experience on Columbia River data collection and fisheries management. Extensive experience in data collection, coordination, summarization, and analysis plus designing and planning research activities. Was involved with the "discovery" of fall chinook spawning below Bonneville and John Day dams. Extensive experience capturing wild juvenile fall chinook with stick and beach seines on the Hanford Reach and Lewis River CWT projects.

Experience

1981-present: Pacific States Marine Fisheries Commission. Currently responsible for planning and supervising the daily activities related to recoveries of CWTs from the Washington side of the Columbia River. Previous duties included extensive involvement in CWT analysis used for Columbia River fall chinook run reconstruction's and run predictions. Have personally collected biological and mark sampling data from the mainstem

Columbia and its tributaries from the mouth upstream to the Okanogan River in Canada. Since the early 1980's, have been involved in the capturing and tagging of wild juvenile fall chinook on the Hanford Reach and/or the Lewis River.

1980 Washington Department of Fish and Wildlife. Hanford Reach of the Columbia River. Collected CWTs and biological data from the Hanford Reach fall chinook sport fishery. In addition, collected CWTs and biological data from hatchery and natural spawn escapements upstream from McNary Dam.

1980 Washington Department of Fish and Wildlife. Grays Harbor, Washington. Used stick and beach seines to evaluate juvenile salmonid abundance in several area streams.

Relevant Publications

Hymer, J. April 1997. Results of Studies on Chinook Spawning in the Mainstem Columbia River below Bonneville Dam. WDFW Columbia River Progress Report # 97-9. Washington Department of Fish and Wildlife. Battle Ground, Washington.

Hymer, J. June 1993. Washington Columbia River and Tributaries Stream Survey Sampling Results 1992. WDFW Columbia River Progress Report 93-19. Washington Department of Fisheries. Vancouver, Washington.

Hymer, J., R. Pettit, K. Harlan, L. Harlan, and R. Roler. February, 1997. Run Size Forecast of the Return of Columbia River Fall Chinook Salmon Stocks in 1997. WDFW Columbia River Progress Report 97-05. Washington Department of Fish and Wildlife. Battle Ground, Washington.

Patrick A. Frazier
Oregon Department of Fish and Wildlife
Fish Division
Columbia River Management, Clackamas

0.25 FTE (Hours = 520)

Education B.S. Fishery Science Oregon State University, 1981

Summary of Qualifications

Seventeen years of service for Oregon Department of Fish and Wildlife on fishery management and research programs, including five years on the Rogue River research project and 12 years with the Columbia River Management group. Considerable experience in management and sampling of commercial and sport fisheries.

Experience

1996-Present: Assistant Project Leader (SFWB), Columbia River fisheries management program, Clackamas, OR.

1994-1996: Project Leader (FWB-3), Columbia River commercial sampling program, Clackamas, OR.

1989-1993: Project Leader (FWB-2), Columbia River commercial sampling program, Clackamas, OR.

1986-1989: Staff biologist (FWB-1), Willamette River spring chinook statistical creel programs.
Clackamas, OR

1983-1986: Project Assistant (EBA & FWB-1), Rogue River Research Study.
Corvallis

Extensive experience with both commercial and sport fishery sampling programs. Participated at all levels of sampling programs from actual field sampling positions to supervisory program leader positions.

Duties have not been limited to fishery sampling programs. Pat has performed a used a variety of statistical methods to develop run size forecasts, perform run reconstruction's, determine the status salmonid stocks being reviewed for possible ESA listing, determine fallback rates at Snake River dams, determine effects of environmental factors on growth and survival rates of Rogue River chinook.

Prior to joining the Columbia River Management program Pat worked on the Rogue River research project. Field duties for this project including juvenile beach seining, adult beach seining, and spawning ground surveys.

The ODFW Natural Resource Specialists 4's would provide expertise in analytical methods. This position would also be responsible for coordinating this project with the Fish Passage Advisory Committee and other Columbia River water managers. The two months of Natural Resource Specialists time would be split between two positions. One of the positions will have considerable experience with statistical methods while the other *position will be familiar in dealing with the Fish Passage Advisory Committee as well as other water managers.*

The ODFW Supervisory Fish and Wildlife Biologist will be responsible overseeing the juvenile portion of this project, handling the contracts, and editing final reports. This position would also be responsible for supervising and hiring employees as needed to complete this project. It is expected that these responsibilities will be assumed by a staff person working at the Clackamas office. This person will have been with the Columbia River Management program for over ten years and was promoted to this supervisory position about two years ago.

The lead person for this project would be a WDFW Fish Biologist 3. This person would be responsible for supervising and overseeing the adult portion of this project, handling the contracts, and editing the final reports. This person would also be responsible for hiring the WDFW Scientific Technician 3. It is expected the someone already on staff at this office will fill this position. Several persons at this office have multi-years of experience in Columbia River fall chinook studies. This position may span several months but should only require one month of actual work.

The ODFW Natural Resource Specialist 2's will be responsible for coordination of the data collection. These persons would also be responsible for age and stock composition, summarizing emergence timing data, calculating survival rates, and producing juvenile migration rate estimates plus purchasing equipment. Daily duties could including reading scales and CWTs and data base entry. This person would be the primary author of the final report. This position would be 4-months from October through January on the adult portion of this project and 4-months from May through August on the juvenile portion of this project. The person or persons selected for this project may or may not currently be a member of ODFW; however, this person or persons will become a member of ODFW's Columbia River Management staff. The Columbia River Management program has been managing Columbia River fisheries for over 50 years and has considerable expertise with these kinds of field projects.

For years, WDFW has used Scientific Technician 3s to lead Columbia River fall chinook sampling crews. In addition, most Scientific Technician 3s have multi-years experience operating jet boats and Columbia River fall chinook studies. The Scientific Technician 3 would be responsible for building and maintaining the necessary sampling equipment. The Scientific Technician 3 would be responsible for error checking and summarizing the raw data. Daily duties could include operating jet sleds, and collecting GSI, DNA samples plus biological and mark sampling data. This position would be 3-months from October-December.

A second WDFW Scientific Technician 3 position working on the juvenile portion of this project would be required. This position would function as a crew leader for the juvenile seining project. WDFW has been conducting a juvenile seining project on the Lewis River since 1977 and it is expected that the person filling this position will have considerable experience with the Lewis River project.

The two Experimental Biological Aides working on the adult portion of the project would be responsible for counting live fish and redds. In addition, these people would assist GSI, DNA, and biological and mark sampling. Each position would be 2.5-months from mid-October to December The one Experimental Biological Aide working on the juvenile portion of this project would assist in setting and monitoring emergence traps, collecting GSI and DNA samples, collecting biological data from juvenile chinook and chum, recording data in the field, and maintaining equipment. This position would be 5-months from April through August. The ODFW Experimental Biological Aide positions are commonly used for a variety of field activities. Many of the persons currently filling these positions with Columbia River Management have had several years of service with the Columbia River Management Program.

Section 10. Information/technology transfer

The results from this project will be published in a report. Summaries of raw biological data will be available in a computerized data base. CWT recoveries information will be available from the PSMFC data base. All data summaries and analyses produced by this project would be made available for use by the BPA funded Streament Project.